Research Paper | Health Science | E-ISSN No : 2454-9916 | Volume : 4 | Issue : 6 | June 2018

STATUS OF HBSAG PREVALENCE IN A DENTAL COMMUNITY – A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Hepatitis-B is one of the major public health problems and is a well-recognized risk factor amongst healthcare workers due to their occupational exposure. As such, it is of prime importance to understand the risk factors and the measures needed to avoid or overcome them.

Aim: To estimate the prevalence of Hepatitis B surface antigen amongst dental staff members and students.

Methods: A total of 462 Healthcare Workers were grouped in 5 categories according to the years of clinical exposure. After institutional ethical clearance and individual written consent, all Healthcare Workers were explained about the objective of the study and were asked to fill a standard questionnaire regarding their personal health information and vaccination status. Their blood samples were tested by Enzyme Linked Immunosorbent assay for Hepatitis B surface antigen.

Results: 9 (1.94%) Healthcare Workers were found to be positive for Hepatitis B surface antigen. A statistically significant correlation was found between the years of clinical exposure and the seroprevalence of Hepatitis B surface antigen ($p<0.05$).

Conclusion: For an educational institute and hospital, the prevalence rate is considerably high and it reflects upon the proportionate increase in exposure to virus with clinical exposure. It also points towards the low level of awareness regarding occupational risk of Hepatitis B among Healthcare Workers. This calls upon an urgent and mandatory need to incorporate Hepatitis B Virus vaccination amongst Healthcare Workers at a sizeable scale.

KEYWORDS: Dental health care workers, Hepatitis B surface antigen, Hepatitis B, Seroprevalence

INTRODUCTION:

Hepatitis-B virus (HBV) is a double stranded deoxyribonucleic acid (DNA) virus from the Hepadnaviridae family. HBV is about a hundred times more infectious than human immunodeficiency virus. Similar to the latter it is transmitted via parenteral, sexual or perinatal mode [1]. It affects the liver and depending upon its first or recurrent attack causes both acute and chronic infections respectively [2]. It is the most common cause of chronic liver disease, including cirrhosis of the liver and hepatocellular carcinoma worldwide. Hepatitis B is estimated to infect around 2 billion individuals worldwide, and 350 million among these are suffering from chronic HBV infection. The global prevalence of HBV infection, based on its endemicity ranges from high (≥8%) to intermediate (2-7%) and low (<2%). South East Asia and sub-Saharan Africa are high endemic areas for HBV, making it a major public health problem in these regions [3]. India has approximately HBV carrier rate of 3.0%. With a population of more than 1.25 billion, India has more than 37 million HBV carriers and contributes a large proportion of this HBV burden [4].

HBV can be identified by various biomarkers which appear in body fluids after infection, Hepatitis B surface antigen (HBsAg) being the first virological marker detectable in blood around one month after exposure [5]. Other useful serological markers of HBV infection are Hepatitis B surface antibody (anti-HBs), Total hepatitis B core antibody (anti-HBc) and IgM antibody to hepatitis B core antigen (IgM anti-HBc). HBsAg can be detected in high levels in serum during acute or chronic HBV infection. The presence of HBsAg indicates that the person is infectious. The presence of anti-HBs is generally interpreted as indicating recovery and immunity from HBV infection. Anti-HBs also develops in a person who has been successfully vaccinated against hepatitis B. Anti-HBc appears at the onset of symptoms in acute hepatitis B and persists for life. The presence of anti-HBc indicates previous or ongoing infection with hepatitis B virus in an undefined time frame. IgM anti-HBc positivity indicates recent infection with hepatitis B virus (<6 months). Its presence indicates acute infection [6]. However, not everyone who tests positive for HBV needs treatment. About 95% of adults build positive immune response against the infection and recover after several months. Unfortunately, about 5% of adults and up to 90% of children under age 5 years are unable to clear the infection and develop acute and/or chronic HBV infection [5].

Healthcare personnel are defined as persons whose activities involve contact with patients or with blood or other body fluids from patients in a healthcare, laboratory, or public safety setting. An exposure that might place HCWs at risk for HBV infection is defined as a percutaneous injury (e.g., a needlestick or cut with a sharp object) or contact with mucous membrane (of eyes, mouth, nose, etc.) or nonintact skin (e.g., exposed skin that is chapped, abraded, or afflicted with dermatitis) with blood, tissue, or other body fluids that are potentially infectious [7]. Recognizing that the medical personnels and dentists are amongst the most highly exposed groups of HCWs, and in view of their concern for the risk of acquiring these viruses, routine screening of HBV is highly recommended by CDC [8].

So far, only a handful studies have been conducted in India to estimate the prevalence of Hepatitis B amongst the dental HCWs. Our study intends to estimate the seroprevalence of HBsAg amongst the dental HCWs and also to know their level of awareness regarding the disease.

AIM: Our aim was to estimate the prevalence of HBsAg amongst dental staff members and students.

MATERIALS AND METHODS:

This prospective study was carried out in a dental college in Uttar Pradesh, India. 462 dental HCWs of college were included in the study. They were grouped according to their years of exposure to patients/clinics (Table I). Individual written consent and history was taken from each participant using predesigned consent and history forms. Efforts were made to maintain confidentiality and sterilization in all possible ways. Institutional ethical committee clearance was obtained before proceeding with the study.

Control group: Individuals who had no prior contact with blood and blood contaminated articles were included as controls.

Inclusion criteria: Healthcare workers who had direct contact with blood and blood contaminated articles and those with no history of blood transfusion were included in the study.

Exclusion criteria: Healthcare workers with known HBsAg positive status, documented immune suppression or on prolonged steroid therapy, past history of jaundice or known chronic liver disease, recently immunized (within last 1 month) and those not willing to participate in the study were excluded from the study.

Material: A Commercially available ELISA Kit (ERBA LISA SEN HBsAg) was used for diagnosis of HBsAg in blood serum of the subjects. A predesigned questionnaire was the tool for data collection regarding knowledge and awareness about Hepatitis B.

Methodology: A sample of blood (2 ml) was drawn in an aseptic condition in plain vial. Serum was separated by centrifugation at 2200-2500 RPM for 15 minutes and tested for HBsAg by ELISA according to the specifications of the kit used. The results were generated in terms of optical density by the ELISA reader and were then interpreted according to the instruction leaflet provided in the kit.

Table I: Group Wise Distribution of Dental Health Care Workers

Groups	Years of Exposure to Patients	Members Included	Number	Total
Group A	N. A	Controls	40	40
Group B	0	1st Year B.D.S Students 2nd year B.D.S Students	22 80	102
Group C	0 – 3	3rd Year B.D.S Students 4th year B.D.S Students Interns	84 83 67	234
Group D	> 3-6	Postgraduate students	46	46
Group E	> 6-9	Teaching staff members	40	40
			Grand Total	462

Interpretation: Cut-off value was calculated for each run using the formula provided in the kit specification. Samples with the optical density less than the cut-off value were considered "Non-reactive". Samples with optical density equal to or greater than the cut-off value were considered "Initial reactive". Initial reactive samples were retested in duplicate. If the optical density of the duplicates was less than the cut-off value, the specimen was considered Non-reactive. If the retested result of the duplicate was found reactive, the specimen was considered "Repeatedly Reactive".

Data analysis: Our data was discrete categorical data so this was presented as n (%). Categorical data were compared using Pearson Chi-square test. All analyses were conducted using SPSS for Windows (version 21.0; SPSS Inc., Chicago, IL, USA). For all analyses, the nominal level of statistical significance was<0.05.

RESULTS:

Out of 462 HCWs, 9 (1.94%) HCWs were found to be positive for HBsAg (Table II). Only one sample was positive in Group B (1/102;1%), two in Group C (2/234;0.85%), three in Group D (3/46;6.52%) and three in Group E (3/40;7.5%). A statistically significant correlation was found (p=0.007) between seroprevalence of HBsAg and years of clinical exposure of healthcare workers and students.

Table II: Group Wise Test Results

Group	Test Results		Total
	Negative	Positive	
A	40 (100%)	0(0%)	40
B	101(99%)	1(1%)	102
C	232(99.1%)	2(0.8%)	234
D	43(93.4%)	3(6.5%)	46
E	37(92.5%)	3(7.5%)	40

DISCUSSION:

HBV is a partially double-stranded DNA virus and a member of the hepadnaviridae family, which infects primarily humans, but also primates experimentally [9]. It is a 42-nm sphere that contains a core (nucleocapsid) which encloses the DNA and an outer shell (or envelope) which is composed of several proteins known collectively as HBsAg [10]. Modes of transmission include perinatal, percutaneous, sexual exposure, and close person-to-person contact (e.g. open cuts and sores). More casual contact such as kissing, coughing, or even breast-feeding is not known to lead to transmission [8].

Hepatitis B prone population includes people born in high endemic areas, household and sexual contacts of HBsAg positive persons, drug addicts, polygamous people, people with history of STDs, homosexuals, individuals infected with HIV or Hepatitis C virus, pregnant women, patients undergoing dialysis and HCWs [8,11]. HCWs who perform invasive procedures, for example surgeons, dentists, emergency workers and those who handle human specimens like the laboratory technicians have been consistently shown to have higher prevalence of HBV infection than their counterparts [12-14]. The dental environment has especially been shown to be a high risk setting for HBV infection among dentists and possibly, their patients. HBV has been detected in blood and in saliva, which are common contaminants in the dental environment [15]. In addition, HBV has been demonstrated to survive in dried blood, at room temperature, on environmental surfaces, for at least one week. Thus, HBV infections that occur in HCWs with no history of exposure might have resulted from direct or indirect blood or body fluid exposures that inoculated HBV into the mucosal surfaces or cutaneous scratches and other lesions [16].

The diagnostic tools used to characterize the state of HBV infection include serologic, virologic, biochemical, and histologic tests. Various biomarkers like HBsAg, anti-HBs, anti-HBc, Hepatitis B e-antigen (HBeAg) and antibody against Hepatitis B e-antigen (anti-HBe) have been consistently used for diagnosing Hepatitis B virus in serum and blood [7]. However, HBsAg) is one of the first serologic markers to appear after infection, and its persistence for more than 6 months indicates chronic HBV infection [17,18]. The cost effectiveness and simplicity of technique used for detection of HBsAg makes it the most appropriate diagnostic tool for mass screening of Hepatitis B infection.

The HBV burden has been consistently on a ramshackle after the introduction of vaccination. The prevalence rate of Hepatitis B amongst HCWs by Elavia AJ et al [19] in 1992 (Eight hundred and sixty-three hospital employees of a Hospital in India including doctors, nurses, technicians, office workers, orderlies and other ancillary staff were screened by ELISA for both HBsAg and anti-HBs was 10%. In a study by Kardam et al (2014), conducted in a Dental educational institute in Faridabad, Haryana on 240 HCWs, 1.25% were reported to be HBsAg positive [20]. More recently in a study by Taishete S, Chowdhary A (2016), on 437 HCWs of 11 Civil Hospitals and Sub-District Hospitals in New Delhi, prevalence rate of 2.51% was reported [21]. Our study revealed a total seroprevalence of 1.94% amongst the dental HCWs in a dental institute. It was also revealed in the study that number of years of exposure was correlated with the seroprevalence of HBsAg.

Hepatitis B vaccination is the most effective measure to prevent HBV infection and is expected to decrease progressively the burden of HBV infection [22]. The vaccine against Hepatitis B has been available since 1982 and is 95% effective in preventing HBV infection and its consequences, [23] but its use among HCWs in the developing world is low [24-27].

Most Hepatitis B vaccines presently available are obtained by recombinant DNA techniques, and are used with two alternative schedules. Vaccine are given at month 0, 1, 6 (three doses) intramuscularly in the deltoid muscle [28]. A level of anti-HBs (antibody titre) greater than or equal to 10 mIU/ml is conventionally considered as being protective [29]. Vaccine non-responders should receive up to three additional doses in order to achieve seroprotective level of antibodies and to induce immunologic memory. These may be given as a repeated course of immunisation (0, 1, 6 months) or separate doses given approximately 3 months apart [30]. However, India with the largest birth cohort in the world, is yet to complete the introduction of Hepatitis B vaccine coverage to all parts of the country [31]. The need for booster doses in order to keep the level of anti-HBs above the protective titre has long been debated. Periodic boosting after 5, 7 or 10 years from the primary course has been proposed by various researchers [32].

Hepatitis B immunization should always be followed by a mandatory check of the anti-HBs titre 1–2 months following the final dose of the hepatitis B vaccine series. An anti-HBs serologic test result of >10mIU/mL indicates immunity. If a HCW's serologic test (anti-HBs) is negative 1–2 months after the last dose of vaccine, the 3-dose series should be repeated and then test for anti-HBs 1–2 months after the last dose of vaccine. If the HCW is still negative after the second vaccine series, the HCW is considered a non-responder to hepatitis B vaccination. The HCW should be counselled that non-response to the vaccination series most likely means the he/she is susceptible to HBV infection. The HCW should then be counselled to discuss what non-response to the vaccination series means for that specific HCW and what steps should be taken in the future to protect his/her health [33].

CONCLUSION:

There is a need for well-planned national policies to be formulated by our government regarding Hepatitis B awareness and vaccination. Mass vaccination programmes should be conducted for HCWs as soon as they enter health care sector with its mandatory life-long follow up till the exposure risk persists. The importance of routine screening campaigns also needs to be emphasized as early diagnosis is the key to safety. Furthermore, the individuals should undergo a mandatory test after 1-6 months of completion of vaccination program to ensure attainment of adequate protective antibody levels. Although many of the government run health institutes in our country vaccinate every student and staff member against HBV compulsorily, the condition in private institutes is still a matter of concern.

ACKNOWLEDGEMENTS:

The authors would like to thank, Dr. Swati Gupta, Head of Research centre at I.T.S Dental College and Hospital, Greater Noida for her support during the study.

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